

WHAT IS CLAIMED IS:

1. A method of making a touch fastener having a non-planar topography, the method comprising;
 - 5 providing a sheet form base, the sheet form base having an upper face, a lower face, and a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the upper face of the sheet form base; and
 - subsequently thermoforming the sheet form base to provide a touch fastener having a non-planar topography.
- 10 2. The method of claim 1 further comprising;
 - 15 continuously introducing molten resin to a gap formed along a peripheral surface of a rotating mold roll, such that the resin forms at least a part of the sheet form base at the peripheral mold roll surface and fills an array of fixed cavities defined in the rotating mold roll to form portions of the fastener elements as projections extending from the upper face of the sheet form base;
 - solidifying the resin; and
 - removing the solidified resin from the peripheral surface of the mold roll by pulling the projections from their respective cavities.
- 20 3. The method of claim 2 wherein the gap is defined between the mold roll and a counter-rotating pressure roll.
4. The method of claim 2 wherein the gap is defined between the mold roll and an injection die.
- 25 5. The method of claim 2 further comprising;
 - continuously introducing the sheet form base into a buffer region; and
 - thermoforming the sheet form base to comprise a plurality of non-planar regions.
- 30 6. The method of claim 1 further comprising;

continuously introducing molten cross-linkable resin to a gap formed along a peripheral surface of a rotating mold roll such that a cross-linkable resin forms at least a portion of the stems of the male fastener elements;

5 continuously introducing a thermoformable resin into the gap formed along a peripheral surface of a rotating mold roll such that the thermoformable resin forms at least a portion of the sheet form base;

solidifying the cross-linkable and thermoformable resins; and

removing the solidified resins from the peripheral surface of the mold roll by pulling the projections from their respective cavities.

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7. The method of claim 1 wherein the sheet form base comprises a thermoplastic resin.

8. The method of claim 7 wherein the resin comprises polypropylene, PE or PET.

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9. The method of claim 7 wherein the resin comprises high impact polystyrene, polymethylmethacrylate, rigid PVC, plasticized PVC or polycarbonate.

10. The method of claim 1 further comprising forming loop engageable heads on the stems.

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11. The method of claim 10 wherein the heads are formed on previously molded stems.

12. The method of claim 10 wherein the heads are molded simultaneously with stems in fastener shaped molding cavities.

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13. The method of claim 1 wherein the sheet form base is a solid sheet.

14. The method of claim 1 wherein the sheet form base is a foamed sheet.

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15. The method of claim 1 wherein the sheet form base is thermoformed using vacuum applied to the lower face of the sheet form base.

16. The method of claim 1 wherein the sheet form base is between about 0.001 inch to about 0.5 inch thick.

5 17. The method of claim 16 wherein the sheet form base is between about 0.002 inch and about 0.2 inch thick.

18. The method of claim 16 wherein the sheet form base is between about 0.005 inch and about 0.05 inch thick.

10 19. The method of claim 1 wherein the sheet form base is thermoformed at between about 200 °F and about 600 °F.

15 20. The method of claim 1 wherein the upper face of the sheet form base is exposed to a temperature of between about 300 °F and about 550 °F and the lower face of the sheet form base was exposed to a temperature of 200°F and about 600 °F.

21. The method of claim 1 wherein the fastener elements comprise a cross-linkable resin and the sheet form base comprises a thermoplastic resin.

20 22. The method of claim 1 wherein the sheet form base is thermoformed into an undulating surface.

23. The method of claim 1 wherein the sheet form base is thermoformed into an open bowl.

25 24. The method of claim 23 the open bowl further comprising a flange at a rim of the open bowl.

30 25. The method of claim 1 wherein the sheet form base is thermoformed into a mold liner.

26. The method of claim 1 wherein the sheet form base is thermoformed into a framework.

5 27. A method of making a plurality of touch fasteners having a non-planar topography, the method comprising;

providing a sheet form base, the sheet form base having an upper face, a lower face, and a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the upper face of the sheet form base; and

10 thermoforming a continuous sheet form base to provide a plurality of touch fasteners having a non-planar topography.

28. A touch fastener comprising;

15 a sheet form base having an upper face and a lower face, the upper and lower faces having complementary non-planar topography to define therefrom a nominal thickness such that the sheet form base forms a stable structure of three-dimensional contours in an unloaded state, and

20 a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the upper face of the sheet form base, wherein at least some of the male fastener elements extend from a contoured region of the sheet form base.

29. The article of claim 28 wherein the sheet form base has a thickness of less than 0.05 inches.

25 30. The article of claim 28 wherein the structure of the sheet form base comprises a repeating V-shape.

31. The article of claim 28 wherein the structure of the sheet form base comprises an undulating pattern.

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32. The article of claim 28 wherein the sheet form base is flexible.

33. A touch fastener comprising:

a sheet form base having an upper face and a lower face, the upper and lower faces having complementary non-planar topography to define therefrom a nominal thickness such that the sheet form base forms a stable structure of three-dimensional, non-linear contours in an unloaded state; and

a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the upper face of the sheet form base.

10 34. The article of claim 33 wherein the sheet form base has a thickness of less than 0.05 inches.

35. A mold insert comprising:

a sheet form base having an inner face and an outer face, the inner and outer faces having complementary non-planar topography to define therefrom a nominal thickness, wherein the sheet form base defines an open bowl structure that is stable in an unloaded state; and

a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the inner face of the sheet form base.

20 36. The mold insert of claim 35 the sheet form base further comprising a flange extending from a rim of the bowl.

37. The mold insert of claim 36 wherein the flange includes metallic particles.

25 38. The mold insert of claim 35 wherein the thickness of the sheet form base is less than 0.4 inches.

39. The mold insert of claim 35 wherein the open bowl structure is flexible.

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40. The mold insert of claim 35 wherein the bowl is constructed to withstand greater than atmospheric pressure exerted on the outside of the bowl without collapse.

41. The mold insert of claim 35 wherein the open bowl structure is elongated.

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42. The mold insert of claim 35 wherein the sheet form base comprises metallic particles.

43. A framework comprising:

10. a sheet form base having an upper face and a lower face, the upper and lower faces having complementary non-planar topography to define therefrom a nominal thickness such that the sheet form base forms a stable structure of three-dimensional contours in an unloaded state, and wherein the sheet form base defines an aperture; and

a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the upper face of the sheet form base.

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44. The framework of claim 43 wherein the sheet form base defines a plurality of apertures bounded by elongated segments of the framework, each segment carrying multiple fastener elements.

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45. A method of making a molded article, the method comprising:

providing a mold defining a mold cavity;

inserting a mold liner into the mold cavity, the mold liner comprising a sheet form base having an inner face and an outer face, the inner and outer faces having complementary non-planar topography to define therefrom a nominal thickness such that the sheet form base forms a stable structure of three-dimensional contours in an unloaded state and a plurality of male fastener elements, each fastener element having a stem molded integrally with and extending from the outer face of the sheet form base, wherein the mold liner is shaped to conform to at least a portion of the molded article; and

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placing the mold liner against the surface of the mold so the fastener element extends toward the surface of the mold; and

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delivering a foam into the mold cavity and allowing the foam to solidify.

46. The method of claim 45 wherein the mold liner is sized to extend across an extent of the mold cavity to position the fastener elements.

5 47. The method of claim 45 wherein the topography of the mold liner defines a trench in the molded article.

48. The method of claim 45 the mold liner further comprising a material adhered to the inner surface of the sheet form base.

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49. The method of claim 45 the mold liner further comprising protrusions extending from the inner face of the sheet form base, extending away from the surface of the mold.